

ACCESSION NR: AR4015642

thermocouple casings for the chlorination of organic compounds in 18% HCl at 60-65C, and in the dehydration of maleic acid. Ti-equipment is recommended for the bromination of organic compounds in a water medium at 0-3C (pH~1) and a rapid course of reaction. Free halogens, Na nitrite, and some other additives decrease Ti corrosion in the hydrogen halides and sulfuric acid. The protective effect of halogens decreases sharply with a temperature increase to 60-90C, and with increased concentration and prolonged action of the corrosive medium. 29 references. N. Lukashina

DATE ACQ: 07Jan64

SUB CODE: CH, ML

ENCL: 00

Card 2/2

L 15520-63

EWP(q)/EWT(m)/ES(w)-2/BDS

AFETC/ASD/AFWL/SSD

Feb-4

JD/11P(C)/DE

ACCESSION NR: AP3005239

8/0056/63/045/002/0038/0042

12  
69

AUTHORS: Ishkhanov, B. S.; Kornienko, E. N.; Sorokin, Yu. I.; Shevchenko, V. G.;  
Yur'yev, B. A.

TITLE: Cross section of the reaction  $Rh^{103}(\gamma, p)$  19

SOURCE: Zhur, eksper. i teoret. fiz., v. 45, no. 2, 1963, 38-42

TOPIC TAGS: photoproton, rhenium, quadrupole absorption, neutron emission

ABSTRACT: The yield curve of the reaction  $Rh^{103}(\gamma, p)$  was measured for maximum photon energies ranging from 14.5 to 32.5 MeV by recording the photoprotons with scintillation spectrometers. The measurement was aimed at checking the presence of appreciable quadrupole absorption. The cross section calculated by the Penfold and Leiss matrix method reaches  $8 + 1.5$  mb at the maximum, at  $19. + 0.5$  MeV. The half-width at the peak is approximately 5.5 MeV. The cross section increases following a drop in the vicinity of 21--23 MeV, apparently owing to electric quadrupole absorption in the 25--30 MeV region. The integral cross section for the  $(\gamma, p)$  reaction is found to be  $85 + 15$  MeV-mb. It is concluded that an appreciable part of the quadrupole transitions lead, owing to the mixing

Card 1/42 Note: ignore Topic Tag "Rhenium"; should be rhodium

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of the configurations, to the emission of neutrons, in agreement with the presence of asymmetry in the angular distributions of fast photoneutrons, observed on many nuclei, and confirms in addition the important role of the residual interactions in quadrupole absorption. "We are grateful to V. G. Neudachin and N. P. Yudin for a discussion of the results, and also to N. N. Balantov and the Betatron crew for help." Orig. art. has 3 figures. 4

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Institute of Nuclear Physics, Moscow State University)

SUBMITTED: 13Feb 63

DATE ACQ: 06Sep63

ENCL: 02

SUB CODE: PH

NO REF SOV: 011

OTHER: 008

Card

2/4 2

L 16592-65 / EWT(m)/EWA(d)/EWP(t)/EWP(b) IJP(c)/ASD(f)-2/ASD(m)-3 JD/WB/MLK

ACCESSION NR: AT4048064

S/0000/64/000/000/0144/0149

AUTHOR: Babitskaya, S.M., Strunkin, V.A., Zal'tsman, T.D., Sorokin, Yu. I. B+1

TITLE: Chemical stability of titanium in home aggressive media and the areas for its application in the chemical industry <sup>27</sup>

SOURCE: Soveshchaniye po metallurgii, metallovedeniyu i primeneniyu titana i yego splavov. 5th, Moscow, 1963. Metallovedeniye titana (Metallography of titanium); trudy\* soveshchaniya. Moscow, Izd-vo Nauka, 1964, 144-149

TOPIC TAGS: titanium, titanium chemical stability, titanium corrosion, organic acid, chemical industry <sup>27</sup>

ABSTRACT: Tests over a wide range of temperatures and  $H_2SO_4$  concentrations showed that chlorine consistently retards the corrosion of titanium, which increases rapidly with temperature (see Fig. 1 of the Enclosure). In the presence of chlorine, corrosion also increases rapidly with  $H_2SO_4$  concentration, but in its absence the corrosion rate passes through maxima at about 40 and 80%  $H_2SO_4$ . The authors then went on to study corrosion by organic acids, which are weaker than the mineral acids, since such organic acids as acetic acid, formic acid, oxalic acid, maleic acid, phenoxyacetic acid and

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several others strongly corrode cast iron, steel and other metals. Tests with titanium showed strong corrosion in oxalic acid (100 mm/year, or the same as in 20% hydrochloric acid). Low stability of titanium was also noted in formic acid, tartic acid and citric acid, as well as in mixtures of glacial acetic acid with acetic anhydride. Strong corrosion of titanium was observed in hot solutions of oxalic acid and tartaric acid, while the highly aggressive properties of citric acid are explained by the solubility of the compounds in water. These results indicate new possibilities for the use of titanium equipment where hydrochloric, hydrobromic, hydroiodic and sulfuric acids containing free halogens participate in chemical reactions. Titanium tips are employed on thermocouples working in chlorination processes. Laboratory tests have shown the harmful action of alternating current on titanium in acid solutions, but a titanium bubbler has been working successfully in the production of chlorine. It is also advisable to use titanium for the treatment of organic substances with bromine in water. Orig. art. has: 1 figure and 1 table.

ASSOCIATION: none

SUBMITTED: 15Jul64

ENCL: 01

SUB CODE: IC, GC

NO REF SOV: 004

OTHER: 006

Card 2/3



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ACCESSION NR: AT4048064

Corrosion rates mm/year

ENCLOSURE: 01

H<sub>2</sub>SO<sub>4</sub> concentration, %

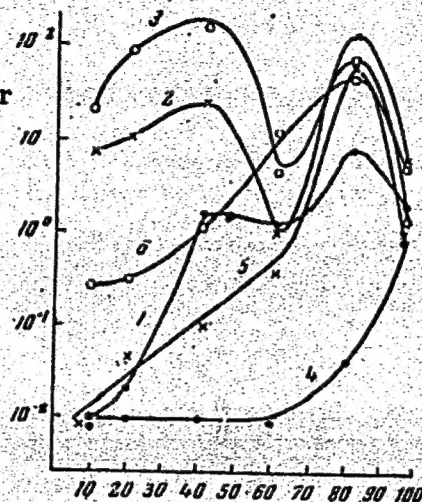


Fig. 1. Effect of chlorine on titanium corrosion by sulfuric acid: 1 - at 20C without chlorine; 2 - at 60C without chlorine; 3 - at 90C without chlorine; 4 - at 20C with chlorine; 5 - at 60C with chlorine; 6 - at 90C with chlorine.

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L 15661-65 EPA(s)-2/EWT(m)/EWA(d)/EWP(t)/EWP(k)/EWP(b) Pr-4/Pt-10 ASD-3/  
AFFTC/ESD-3/IJP(c)/ASD(f)-2/ASD(f)-2/ASD(m)-3 JD/HW/JG/MLK

ACCESSION NR: AT4048066

S/0000/64/000/000/0160/0165

AUTHOR: Sorokin, Yu. I.; Tseytlin, Kh. L. B+1

TITLE: Effect of sodium nitrite on titanium corrosion by hydrochloric and sul-  
furic acids 27 27 18

SOURCE: Soveshchaniye po metallurgii, metallovedeniyu i primeneniyu titana i  
yego splavov. 5th, Moscow, 1963. Metallovedeniye titana (Metallography of titanium);  
trudy\* soveshchaniya. Moscow, Izd-vo Nauka, 1964, 160-165

TOPIC TAGS: titanium, titanium corrosion, sodium nitrate, titanium passivation

ABSTRACT: Titanium corrosion in sulfuric and hydrochloric acid is delayed by oxidizers and anodic polarization. Nitric acid acts in the same way, but little attention has been paid in industry to nitrous acid. Therefore, the effect of sodium nitrite on titanium corrosion by 20% HCl and H<sub>2</sub>SO<sub>4</sub> was investigated using VT1-1 titanium sheets (50x10x3 mm) suspended in a thermostat with or without mixing (method described by S. M. Babitskaya and Kh. L. Tseytlin). After 10, 50, 100 and 200 hours the samples were removed, washed in water, dried and weighed. The tests indicated that titanium has satisfactory stability in 20% hydrochloric and sulfuric acids at 0 and 10C. Increasing the temperature to 60C increased titanium corrosion in hydrochloric acid up to 30 mm/year. At 100C, the corrosion rate of

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titanium by HCl increased again to 200 mm/year. When the sulfuric or hydrochloric acid were not mixed at 20C, the titanium was passivated and corroded at a rate of only about 0.6 mm/year. Increasing the temperature to 60 or 100C also sharply increased the corrosion rate in 20% sulfuric acid. Addition of low concentrations of nitrite passivated the titanium in HCl and H<sub>2</sub>SO<sub>4</sub> better than the addition of nitrous acid. This is due to the formation of nitro oxides by the nitrites. Addition of sodium nitrite passivates titanium in 20% HCl and H<sub>2</sub>SO<sub>4</sub> at 20 and 60C, while at 100C it greatly lowers corrosion. The addition of sodium nitrite results in a positive potential on the titanium surface, satisfactory stability of the titanium being ensured in 20% HCl and H<sub>2</sub>SO<sub>4</sub> with 0.01% NaNO<sub>2</sub> at 20C and with 0.1% NaNO<sub>2</sub> at 60C. Orig. art. has: 6 figures, 1 table and 2 chemical equations.

ASSOCIATION: none

SUBMITTED: 15Jul64

ENCL: 00

SUB CODE: MM

NO REF SOV: 012

OTHER: 007

Card 2/2



L 25323-65 EWT(m)/EWA(d)/EWP(t)/EWP(b) Pad IJP(c) MJW/JD/HW/WB

ACCESSION NR: AP5002951

S/0064/65/000/001/0064/0067

AUTHORS: Sorokin, Yu. I.; Tseytlin, Kh. L.

TITLE: Corrosion of metals in nitrate-nitride melts\*

SOURCE: Khimicheskaya promyshlennost', no. 1, 1965, 64-67

TOPIC TAGS: corrosion, metal, nickel, carbon steel, copper, nitrate, chloride/  
OKh18N9 steel, OKhN3M steel, 12MFKh steel, 12KhMF steel, 12K52F3 steel, 1Kh18N9T  
steel, EPD instrument, OMM5 electrode, EMU 3 electrode, TsL 11 electrode, St.3  
steel, Kh5M steel, Kh17T steel

ABSTRACT: A detailed experimental analysis was made to determine the susceptibility of metals to corrosion in a nitrate-nitride melt at 5000 temperature. Tube-shaped casings with the test specimen were inserted in the openings of a steel tube lattice and loaded with 300 gm of dry nitrate-nitride mixtures. The chlorine-ion concentration in the melt never exceeded 0.01%. Six types of metals were used: carbon steel St.3, steels Kh5M, Kh17T, and 1Kh18N9T, copper, and nickel. Each specimen (flat or loop-shaped) was welded to the casing with a corresponding proper electrode. The corrosion rates were determined by the weight loss in gm/m<sup>2</sup>hr of

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\* Melts or media instead of Metals.

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the particular specimen after removing the scale deposits by a 10% HCl solution. After every 125 hrs, melt and specimen were cooled to room temperature for 50 hrs and then heated back to 500C. Microsections of each specimen were tested, and their weight loss is given in tabular form. It was found that the hardness and ductility of St.3, Kh5M, 1Kh18N9T, and nickel specimens were not affected by the test. Most specimens showed more or less uniform corrosion rates with no structural changes. Only the Kh17T specimen showed some growth of ferrite grains in the corrosion zone. Of these specimens the chrome-molybdenum steels (Kh5M) were found most suitable for nitrate-nitride operation at 500C and carbon steels St.3 for temperatures below 450C. If simplicity in construction is desired, the 1Kh18N9T steel or nickel would be adequate. Orig. art. has: 2 tables.

ASSOCIATION: NIOPIK

SUBMITTED: 00

ENCL: 00

SUB CODE: MM

NO REF SOV: 013

OTHER: 008

Card 2/2

STICH, H., M.I.: V. V. K. K. .

Metal corrosion in a nitrate nitrite melt at 500° C. Khim. prom.  
Zh. no. 1:64-67 za 1965. (MIRA 18:3)

1. Nauchno-issledovatel'skiy institut organicheskikh poluproduktov  
i parazitov.

SOROKIN, YU. I.

USSR/Biology - Sulfate-Reducing Bacteria Aug 52

"New Methods for the Isolation of Sulfate-Reducing Bacteria," Yu. I. Sorokin

"Trudy Inst Microbiol, Akad Nauk SSSR," No 2, 1952, pp 121-129

Sulfate-reducing bacteria, the ecology and physiology of which are of considerable sci and practical importance (these bacteria may use mol H, org acids, petroleum hydrocarbons, etc. as donors of H), hitherto could not be conveniently isolated in the form of pure cultures because of the ease of contamination with other bacteria. A satisfactory method

239T7

of cultivation involving the use of sulfate plus sodium formate or mol H in an agar medium to which bouillon and ascorbic acid are added, has now been developed.

239T7

SOROKIN, Yu.I.

Some features of metabolism of acetone-ethanol bacteria with application of enzyme poisons. Trudy Inst. Mikrobiol., Akad. Nauk S.S.S.R. No.2, 89-99 '52. (MLRA 5:12)  
(CA 47 no.15:7590 '53)



SOROKIN, Yu. I.

Role of phosphorus compounds in the biokinetics of bacterial metabolism. Yu. I. Sorokin (Inst. Microbiol., Acad. Sci. U.S.S.R., Moscow, *Mikrobiologiya* 23, 79-98 (1954).—The literature is reviewed for adenosinedi- and triphosphoric acids, di- and triphosphopyridine nucleotides, flavine-adenine dinucleotides, and other coenzymes. 97 references.

Julian P. Smith

SOROKIN, Yu. I.

✓ Balance of carbon in autotrophic nutrition of bacteria which reduce sulfates with molecular hydrogen. Yu. I. Sorokin. *Doklady Akad. Nauk S.S.S.R.* 90, 897-9 (1953); cf. *C.A.B.* 49, 10427b. — Expts. with *Vibrio desulfuricans* in a H<sub>2</sub> atm. in mineral medium with ample phosphate and sulfate supply indicate that the reduction of sulfate is accompanied by synthesis of org. matter from C of CO<sub>2</sub>. The amount of consumed H is always greater than the amt. necessary for reduction *per se*, indicating that mol. H is being employed rather than that of H<sub>2</sub>O of the medium. The amt. of synthesized org. matter corresponds to the amt. of utilized CO<sub>2</sub>.  
G. M. Kosolapoff

SOROKIN, Y. I.

Chemistry of the process of hydrogen reduction of sul-  
fates, Yu. I. Sorokin, *Trudy Inst. Mikrobiol. Akad.*  
*Nauk S.S.S.R.* 3: 41-43 (1964). — A careful chem. balance  
was run on a culture of *Desulfovibrio furicans* in mineral  
medium in  $H_2$  atm., by analyses for oxidation of  $H_2$ , reduc-  
tion of  $SO_4$ , formation of  $H_2S$ , and C (in the org. and inorg.  
forms), the latter detn. being done gasometrically. Reduc-  
tion of  $SO_4$  is accompanied by synthesis of org. C compds.  
from  $CO_2$  and the vol. of  $H_2$  oxidized in the process exceeds  
that needed for formation of that amt. of  $H_2S$  from  $SO_4$ ,  
which is actually found in the system; the difference cor-  
responds to the amt. needed to reduce  $CO_2$  to a carbohydrate.  
Thus, the energy of anaerobic oxidation of  $H_2$  is employed  
for assimilation of  $CO_2$ . The results indicate that mol.  $H_2$   
is the actual reducing agent that acts on  $CO_2$ . G. M. K.

USSR

3

Agar

SOROKIN, Yu. I.

Participation of phosphate in the chemosynthesis in sul-

fate-reducing bacteria. Yu. I. Sorokin: *Doklady Akad. Nauk S.S.S.R.* 95, 661-663, 1954. Study was made of phosphorylation, coupled with anaerobic oxidation of H<sub>2</sub>, in connection with possible participation of P compds. in the energy transfer in chemosynthesis in *Desulfovibrio desulfuricans*. Preliminary expts. in the presence of NaN<sub>3</sub> showed blocking, by this poison, of the propagation of the organisms; without, however, blocking the reduction of sulfates by them; in fact, stimulation of the reduction with H<sub>2</sub> was observed. Hence, phosphorylation is an important factor in this system. Use of P<sup>32</sup>-labeled phosphate in the study of the relation of phosphorylation rate to the H<sub>2</sub> reduction of sulfates, run alternatively in H<sub>2</sub> or in N<sub>2</sub>, with or without NaN<sub>3</sub>, showed that anaerobic oxidation of H<sub>2</sub> at the expense of sulfates in the cells of *D. desulfuricans* is accompanied by intense phosphorylation; replacement of H<sub>2</sub> by N<sub>2</sub> stops the entry of P into the cells and stops oxidative phosphorylation. NaN<sub>3</sub> stops oxidative phosphorylation almost completely; NaN<sub>3</sub> blocks it significantly. The expts. indicate the possibility of utilization of the energy of H<sub>2</sub> oxidation for assimilation of CO<sub>2</sub>; the presence of CO<sub>2</sub> sharply increases dephosphorylation of org. phosphate which had been previously accumulated in the cells. Apparently the chemosynthesis in this organism is in 2 steps: H<sub>2</sub> is oxidized by O of the sulfates, the resulting energy release is bound in org. phosphates, and in the 2nd phase the latter utilize this energy for assimilation of CO<sub>2</sub>.  
G. M. Kosolapoff

SOROKIN, Yu. I.

"Study of Phosphorus Metabolism During Chemosynthesis in Sulfate-Reducing Bacteria With use of P-32," edited by A. A. Imshenetskiy, Corresponding Member, Academy of Medical Sciences USSR, Moscow, Publishing House of the Academy of Sciences USSR, 1955, 239 pp

Sum 1467



Sorokin, Yu. I.

✓ Oxidation of organic compounds by molecular oxygen under the action of ionizing radiation. I. Formation of peroxide compounds in liquid hydrocarbons. N. A. Bakht. *Symposium on Radiation Chem. Moscow* 1955, 110-27 (Engl. translation). II. Formation of stable products of oxidation in hydrocarbons of various structures. N. A. Bakht and N. I. Popov. *Ibid.* 120-34. III. Oxidative radiolysis of ethyl alcohol. N. A. Bakht and Yu. I. Sorokin. *Ibid.* 136-44. IV. Oxidative radiolysis of acetic acid. N. A. Bakht and V. V. Saracova. *Ibid.* 145-51. — See C.A. 50, 4649abcd. B. M. R.

Chem

PM 827

8000

SOROKIN, Yu. I.

Method of staining bacteria which stain poorly. Trudy Biol.sta.

"Borok" no.2:414-415 '55. (MIRA 9:6)

(Stains and staining (Microscopy))

SOROKIN, YU. I.

AG ✓ Bacterial chemosynthesis in silts. Yu. I. Sorokin. *Mikrobiologiya* 24, 393-9(1955).—A technique was developed for using  $C^{14}$  as tracer for measuring chemosynthesis in silts as influenced by conditions. Assays of  $CO_2$  utilization were compared with controls cultured in presence of 0.002–0.005N  $NaN_3$ , which inhibits chemosynthesis without stopping heterotrophic reactions. Estuary silts from the Volga and other rivers were tested, along with high-productivity gray silt I and low-productivity peaty silt (II) from the Rybinsk reservoir. Cultures were incubated 1–2 days in presence of a  $C^{14}$  carbonate soln., aerobically or in an atm. of  $H_2$  or  $CH_4$ . Chemosynthesis was calcd. from the  $C^{14}$  content of the evolved  $CO_2$  by the equation:  $K_c = (r \cdot K_{co} \cdot 10^3) / R_n$ , where  $K_c$  is productivity per kg. of raw silt,  $r$  is the radioactivity of org. matter formed by chemosynthesis,  $R$  is total radioactivity and  $K_{co}$  the carbonate C content of the culture liquid, and  $n$  is mg. of silt sample. Chemosynthesis was roughly parallel (not exactly, since other factors are involved) to bacterial cell count. Thus, I had 10–20 times the cell counts of II; they produced org. matter at the respective rates of 4–6 and 0.5–1.2 mg./kg. Heterotrophic assimilation of  $CO_2$  accounted for 15–19% of the chemosynthesis. Both  $H_2$  and  $CH_4$  intensified chemosynthesis, indicating more participation in nature by these gases than by salts of  $NH_4$  and  $Fe^{2+}$ , to which natural chemosynthesis is sometimes attributed.

Julian F. Smith

Sorokin, Yu. I.

✓  
AC Efficiency of chemical synthesis in silt deposits. Yu. I. Sorokin (N. A. Morozov Biol. Sta., Borok). *Doklady Akad. Nauk S.S.S.R.* 103, 875-7 (1955). The rate of chem. synthesis in silt deposits was detd. in several regions of upper Volga river by incubation of the silt with  $\text{Na}_2\text{C}^{14}\text{O}_3$  in the dark. The av. level of reactivity is 3-9 mg. of org. C per kg. of raw silt. Addn. of  $\text{CH}_4$  and  $\text{H}_2$  increases the general reaction rate many times. Assimilation of  $\text{CO}_2$  by bacteria in the presence of  $\text{NaN}_3$  comprises some 10-20% of total utilization of mineral C.  
G. M. Kosolapoff

SOROKIN - YU. I.

✓ Determination of the magnitude of chemosynthesis in the waters of Rybinsk reservoir by means of carbon-14. Yu. I. Sorokin, *Doklady Akad. Nauk S.S.S.R.* 105, 1343-6 (1965).—Water samples after filtration from phytoplankton were treated with  $\text{Na}_2^{14}\text{CO}_3$  and after incubation, *in situ* in the reservoir, the radioactivity of newly formed org. matter was detd. Daily chemosynthesis reaches a 2-4 mg./cu.m. rate if no  $\text{H}_2$  and  $\text{CH}_4$  are supplied to the samples; if  $\text{H}_2$  is added, the rate climbs 10-20 fold, while addn. of  $\text{CH}_4$  raises the rate 3.5-4 fold. It is suggested that under the winter ice extensive chemosynthesis of org. matter takes place since considerable amts. of  $\text{CH}_4$  are accumulated there at the time when photosynthesis is nearly suppressed.

G. M. Kozlovskii



SOROKIN, Yu.I.

Use of radioactive carbon  $C^{14}$  in studying primary production of waters. Trudy Gidrobiol.ob-va 7:271-286 '56. (MLRA 10:2)

1. Nauchno-issledovatel'skaya Biologicheskaya stantsiya "Borok" imeni N.A.Morozova Akademii nauk SSSR.

(Carbon--Isotopes) (Rybinsk Reservoir--Phytoplankton)  
(Photosynthesis)

USSR / Microbiology - General Microbiology.

F

Abs Jour: Ref Zhur-Biol., No 9, 1958, 38348.

Author : Sorokin, Yu. I.

Inst : Not given.

Title : Theory of Chemoautotrophy.

Orig Pub: Mikrobiologiya, 1956, 25, No 3, 363-375.

Abstract: Review. Problems are discussed on the physiology, biochemistry, and evolution of chemoautotrophic bacteria, as well as the mechanism of biological oxidation and transfer of energy, the mechanism of CO<sub>2</sub> absorption in chemosynthesis. The idea of the unity of basic characteristics in biochemical organization of metabolism in all living organisms is emphasized.

Card 1/1

STEWART, T. I.

"The results and prospects of using  $C^{14}$  for a study of carbon turnover in water basins," a paper submitted at the International Conference on Radioisotopes in Scientific Research, Paris, 9-20 Sep 57.

BOGOMOL, Y. I.

"The Evolution of Chemosynthesis," a paper presented at the International Symposium on the Origin of Life on the Earth, Aug 57, Moscow.

USSR/Microbiology - General Microbiology. Water and Air  
Microorganisms.

F

Abs Jour : Ref Zhur Biol., No 22, 1958, 99342

Author : Sorokin, Yu.I.

Inst : Baikal Limnological Station, AS USSR

Title : A Study of Cultures of Sulfate-Reducing Bacteria  
Isolated from Certain Native Materials of the Near-  
Baikal Region.

Orig. Pub : Tr. Baykalsk. limnol. st. AN SSSR, 1957, 15, 397-407

Abstract : From cold and hot mineral springs and wells of the  
near-Baikal outcropping from sedimentary rocks, as well  
as from muds of the Baikal and lake Kholenur, bacteria  
which actively reduce sulfates were isolated. A series  
of isolated cultures are able to use molecular hydrogen  
for the reduction of  $H_2SO_4$ . In the sub-petroleum water

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USSR/Microbiology - General Microbiology.

F-1

Abs Jour : Ref Zhur - Biol., No 12, 1958, 52742

Author : Sorokin, Yu.I.

Inst : ~~USSR Academy of Sciences~~

Title : Determination of Chemosynthesis Effectiveness in Methane and Hydrogen Oxidation Under Reservoir Conditions.

Orig Pub : Mikrobiologiya, 1957, 26, No 1, 13-16.

Abstract : Based on the hypothesis that the chief sources of energy for chemosynthesis in reservoirs is the oxidation of methane and hydrogen, the author determined the effectiveness of this process in environments closest to natural ones. The chemosynthesis effectiveness was determined using  $\text{Na}_2\text{C}^{14}\text{O}_3$  in flasks with water, out of which plankton was eliminated by passing it through a "preliminary" membrane filter (MF). The flasks, after introduction of  $\text{C}^{14}$  and bubbles of methane or hydrogen, were kept for 2-3 days in dark bags in the reservoir. After that the radioactivity

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USSR/Microbiology - General Microbiology.

F-1

Abs Jour : Ref Zhur - Biol., No 12, 1958, 52740

Author : Sokolova, G.A., Sorokin, Yu.I.

Inst : -

Title : Bacterial Reduction of Sulfates in Muds of the Rybinsk Reservoir.

Orig Pub : Mikrobiologiya, 1957, 26, No 2, 194-201

Abstract : Despite the fact that the water of the Rybinsk reservoir contains little sulfate (20-40 mg/l), its silts yield numerous sulfate-reducing bacteria (SB) on a synthetic medium with  $\text{Na}_2\text{SO}_4$ ,  $\text{MgSO}_4$ ,  $\text{FeSO}_4$ , calcium lactate and 0.8% agar. Activity of SB which reduce sulfates by hydrogen was judged by  $\text{H}_2\text{S}$  formation in test tubes with a medium of the following composition (g/l):  $\text{K}_2\text{HPO}_4$ -5,  $\text{NaH}_2\text{PO}_4$ -3,  $\text{Na}_2\text{SO}_4$ -4,  $(\text{NH}_4)_2\text{SO}_4$ -2,  $\text{MgSO}_4$ -0.1, tap water 50 ml, distilled water 1. After introducing silt, test tubes of a smaller diameter were placed in them (upside down),

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SOROKIN, Yu.I.

Role of chemical synthesis in the production of organic matter in natural waters. Part 1: Chemical synthesis below the ice in Rybinsk Reservoir [with summary in English]. Mikrobiologiya 26 no.6:736-744 N-D '57. (MIRA 11:3)

1. Nauchno-issledovatel'skaya biologicheskaya stantsiya AN SSSR "Borok".

(RYBINSK RESERVOIR--GEOCHEMISTRY)

20-2-56/60

AUTHOR: Sorokin, Yu. I.

TITLE: Influence of Temperature Upon the Intensity of Chemosynthesis  
in a Water Reservoir (Vliyaniye temperatury na intensivnost'  
khemosinteza v vodoyeme)

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol. 114, Nr 2, pp.431-433  
(USSR)

ABSTRACT: Many of the important processes which take place in water  
reservoirs during the winter are connected with bacterial  
activity. The microscopic organisms do not stop their acti-  
vity even at temperatures of the order of magnitude of  
0 to 2°. Among these processes, the following must be mention-  
ed, in particular: the decomposition of organic substances  
in clay deposits, formation and oxidation of methane, and  
finally the nitrification. According to the trophical degree  
of the water reservoir and of its sectors, the bacterial pro-  
cesses during the winter are very intensive, and this leads  
to an accumulation of methane under the ice and to an erup-  
tive development of planktons. Therefore the influence of the

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20-2-56/60

Influence of Temperature Upon the Intensity of Chemosynthesis in a Water Reservoir

low winter temperatures upon this intensity is of great interest. As result of his investigations in the so-called Rybinsk Sea, in the former bed of the Volga River, the author of the paper under review came to the conclusion that in certain places of the layer close to the bottom the bacterial chemosynthesis takes place with high activity. We have here mainly oxidation of methane and hydrogen, which are being formed as result of the decomposition of organic substances in clay deposits. Frequently the values of the chemosynthesis during the winter were considerably higher than those during the summer. During the winter the autotrophic microflora, as compared to the saprophytic microflora, predominated in the layers close to the bottom. Therefore there existed sufficient justification for utilizing the dependence of the speed of chemosynthesis upon the temperature as a general index of the influence of temperature upon the total intensity of the microbiological processes in the water reservoir. The results of these investigations show that the products of the anaerobic decomposition of the organic substance are the source of the energetic material in clays. The temperature coefficient  $K_{10}$ , characterizing the speed of the chemical and biochemical reactions, can be computed with sufficient

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approximation. For most of the biochemical reactions, this coefficient fluctuates between 1.3 and 2.0. The author of the present paper agrees with S. I. Kuznetsov that the temperature does not represent the decisive limiting factor. The absence or presence of oxidizable nutrient substratum has greater influence upon the intensity of the microbiological processes than have temperature fluctuations. There are 1 figure, 1 table, and 4 references, all of which are Soviet, including 1 translation.

ASSOCIATION: Institute of Water Reservoir Biology,  
AS USSR (Institut biologii vodokhranilishch Akademii nauk  
SSSR)

PRESENTED: February 19, 1957, by V. N. Shaposhnikov, Member of the Academy

SUBMITTED: February 18, 1957

AVAILABLE: Library of Congress

Card 3/3

AUTHOR: Sorokin, Yu. I.

20-4-52/60

TITLE: On the Ability of Sulphate Reducing Bacteria to Utilize Methane in the Reduction of Sulphates. (K voprosu o sposobnosti sulfat-vosstanavlivayushchikh bakteriy ispol'zovat' metan dlya vosstanovleniya sul'fatov do serovodoroda).

PERIODICAL: Doklady Akademii Nauk, 1957, Vol. 115, Nr 4, pp. 816-818 (USSR).

ABSTRACT: In geochemical literature the conjecture is made that in the subterranean waters and stones a biochemical process of sulphate reducing occurs until the production of hydrogen sulfide at the cost of methane and under the action of bacteria. This conjecture served as the basis of the reasons of origin of hydrogen sulfide in layers containing of petroleum and natural gas. Kuznetsov explains the thermodynamic probability of such a reduction by means of computations of Pel'sh. Since an isolation of a culture of sulphate reducing bacteria did not succeed this question could not yet be answered. The author had a number of pure and mixed cultures of these bacteria isolated from muds, seeds and from seam waters containing petroleum, which reduced actively the sulphates by means of molecular hydrogen. These cultures were tested as to their ability of sulphate reduction. at the cost of the methane. The used mineral fertile soil is given.

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On the Ability of Sulphate Reducing Bacteria to Utilize  
Methane in the Reduction of Sulphates.

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The hermetic breeding glasses showed no lower pressure after the end of the testing than the control glass. Thus no consumption of methane could be observed. The glasses were then opened and the  $H_2S$  content was measured iodometrically. The analysis results (table 1) showed in no case any considerable accumulation of  $H_2S$  although in some of them several mg of  $H_2S$  were present. This excess was rather contained in the seed material than it is the reduction product of  $H_2O$ . On the occasion of sowing under the same conditions however, a hydrogen atmosphere prevailing, 200-1000 mg of  $H_2S$  per l l of fertile soil were produced. Thus, the results refute the ability of the sulphate reducing bacteria to use methane as a substrate for the reduction of the sulphates to  $H_2S$ . This conclusion is confirmed by theoretical computations of the effectiveness of the free energy ( $\Delta F$ ). According to this the reduction reactions of the sulphates at room temperature cannot occur automatically without supply of energy into the system. The  $\Delta F$ -values have positive values in the case of all (here given) reactions and cannot be used as energy

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SOROKIN, Yu. I.

20-5-40/48

AUTHORS: Sorokin, Yu. I. and Kozlyaninov, M. V.

TITLE: Determination of the Relation Between Phytoplankton Photosynthesis and the Illumination of Water in the Sea of Japan and in the Pacific (Opredeleniye zavisimosti fotosinteza fitoplanktona ot osveshchennosti vodnoy tolshchi v Yaponskom more i Tikhom okeane)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 116, Nr 5, pp. 863 - 865 (USSR)

ABSTRACT: In spring 1957 the investigation of the velocity of the photosynthesis of the phytoplankton in the depth was carried out by the expedition ship "Vityaz" by means of the radioactive carbon isotope within the region of the northern part of the Japan Sea and in the southern part of the Kurilian Kamchatka deep sea depression. The intensity of the photosynthesis depends immediately on the different illumination of the water in different depths. The curves (figure 1, 2) which characterize this dependence show the distribution of the relative intensity of the photosynthesis which in the case of a regular distribution of the phytoplankton in the corresponding water layer had taken place. Simultaneously light measurements were carried out in various depths by means of a photoelectrical hydrometer. Figure 1 shows the curves of the rela-

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Determination of the Relation Between Phytoplankton Photosynthesis and the Illumination of Water in the Sea of Japan and in the Pacific

tive intensity of the photosynthesis  $K_T$  and of the coefficient of the submarine illumination  $K_d$  corresponding to the depth. Figure 2 gives the average values of the submarine illumination in the depth and the values of the relative intensity of the photosynthesis. As it appears from the diagram, these curves approximate to a great extent to a straight line. This proves that the intensity alterations of the photosynthesis are subjected to a law:

$$E_z = E_0 e^{-\alpha z} \cdot K_{Tz} = K_{T0} e^{-\alpha z}, \text{ to such an extent as the}$$

light decreases with increasing depth. In present case the value of the index of the decrease of light was equal to  $0,07 \text{ m}^{-1}$ . Figure 1 and 2 show that the curves found physically or biologically agree completely. This points out an extraordinary adaptability of the marine phytoplankton which exploits completely the light energy for the photosynthesis. Though the spectral composition of the light varies in single depths, the curves of the exposure and of the intensity of the photosynthesis are agreeing even in the deepest layers. Figure 3 shows experiments which were carried out at foggy weather and low transparency of the water. In this case the exposure curves of the photosynthesis do not agree, though they

Card 2/3

AUTHORS: Sorokin, Yu. I., Meshkov, A. N.

20-1-58/58

TITLE: The Assimilability of Protococcus Algae by Tendipes plumosus,  
Determined With the Aid of Radioactive Carbon  $C^{14}$   
(Primeneniye radioaktivnogo ugleroda  $C^{14}$  dlya opredeleniya  
usvoyayemosti protokokkovykh vodorosley motyley Tendipes  
plumosus).

PERIODICAL: Doklady AN SSSR, 1958, Vol. 118, Nr 1, pp. 205-207 (USSR)

ABSTRACT: The isotopic method may be a great help in the qualitative and quantitative study of the nutritive interactions and needs of the aquatic invertebrate animals. Labelling with phosphate containing  $P^{32}$  cannot be used for the quantitative determination of the food eaten or assimilated. This is, however, possible with the use of  $C^{14}$ , as the ratio  $C^{12}/C^{14}$  remains constant during the transformations of carbon in the course of the process of nutrition. Thus the assimilated quantity of this food may be calculated from the radioactivity of carbon in 1 mg of organic substance of the food which was labelled with  $C^{14}$  and from the activity of  $C^{14}$  in the consumer after the test. According to a method expressly worked out for this purpose the authors were able of determining the intensity of assimilation of these algae by the gnat mentioned

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The Assimilability of Protococcus Algae by Tendipes plumosus  
Determined With the Aid of Radioactive Carbon C<sup>14</sup>

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in the title under conditions close to nature. One of the motives were the data (reference 3) that the algae are badly assimilated by this gnat, whereas they are an excellent food for filtering crustaceans and contain many nutritive substances. The Scenedesmus algae were on the way of photosynthesis labelled with C<sup>14</sup> by means of Na<sub>2</sub>C<sup>14</sup>CO<sub>3</sub>. Purified larvae of Tendipes plumosus with emptied intestine were placed in a suspension of algae purified from radioactive carbonate by washing. Further the larvae were fixed, dried and their radioactivity determined by a counter. As the living algae were in the first tests badly assimilated by the larvae of Tendipes plumosus, algae killed by heat and acid products of hydrolysis of dried algae-suspensions were fed. The better assimilation of the products of hydrolysis may apparently be explained by the fact that the larvae consume the bacteria living on them, although a partial nutrition in an osmotic manner does not seem to be out of the question. The percental values of the self-regeneration of organic carbon in the larvae of gnats at the expense of the labelled Protococcus algae proved to be comparatively small. In the

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The Assimilability of Protococcus Algae by Tendipes plumosus 20-1-58/58  
Determined With the Aid of Radioactive Carbon C<sup>14</sup>

case of killed algae and products of hydrolysis they even amounted to 0,07 - 0,2 % per 24 hours. Such a low percentage may on the one hand be explained by the conditions close to nature. The algae only were part of the food of the larvae. Table 1 shows that the reduction of the algae introduced into the mud to 1/10 reduces the process of self-renewal more than to 1/10. It is further to be seen from it that the larvae are not capable of a selective consumption of the algae from the mud. On the other hand the test larvae were in stage IV. They grow slowly and thus the major part of nutrition is used in the basal metabolism. In spite of this the results obtained yield a sufficiently reliable comparative material with regard to the assimilability of the food by Tendipes plumosus. For comparison the same tests were made with Daphnia. Table 2 shows that the Protococcus algae are well digested and assimilated by these crustaceans. The labelled algae here represent the major part of the food and reflect the true speed of the renewal of the body of the Daphniae at the expense of algae nutrition.

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SOV/20-122-6-17/49

AUTHORS: Sorokin, Yu. I., Koblents-Mishke, O. I.

TITLE: The Primary Production of the Japan Sea and of the Part of the Pacific Ocean Near Japan in the Spring 1957 (Pervichnaya produktsiya Yaponskogo morya i chasti Tikhogo okeana, pri-legayushchey k Yaponii, vesnoy 1957 g.)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 122, Nr 6, pp 1018-1020 (USSR)

ABSTRACT: From April to June 1957 the expedition ship "Vityaz'" of the Institut okeanologii Akademii nauk SSSR (Institute for Oceanology of the Academy of Sciences USSR) sailed on her 24th voyage in the Japan Sea and in that part of the Pacific which is near Japan. During the entire voyage primary production was investigated in a water column under 1 m<sup>2</sup> of the surface by the radioactive carbon method. The results obtained by a provisional qualitative evaluation of the phytoplankton collected (carried out by V.V. Zernova), made it possible to compare the phytogeographical characteristics of the waters investigated. The region investigated may be subdivided into 4 parts: I. The western part of the Japan Sea. II. The eastern part of this sea. III. That part of the Pacific which is located

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The Primary Production of the Japan Sea and of the Part of the Pacific Ocean  
Near Japan in the Spring 1957

north of 40° north latitude. IV. The part of the Pacific which is situated south of 40° north latitude. Part I. - the waters of the cold coastal current and of the chalistatic region of the Japan Sea, is inhabited by arctic-boreal and boreal forms. In part II, in the cold Tsushima-current, also tropical forms were found besides boreal ones. Part III is situated in the zone of mixed waters of various origin: the cold Oyashio-current and subarctic waters. This part III characterized by a variety of distribution of the temperature and the salt content in the horizontal as well as in the vertical direction. Some "cold spots" are places at which water rises from the depths to the surface. The phytoplankton of this region consists of arctic-boreal and boreal forms. Near the island of Hokkaido great masses of neritic species such as *Thalassiosira Nordenskiöldi* develop. In part IV the species which characterize the mixed phytoplankton zone predominate. Data concerning primary production and the conditions of observation are given by a table. Primary production varied between 2 mg and 5 g of organic carbon, which was produced in the water column under 1 m<sup>2</sup> of the sea surface per day. The causes to which these

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The Primary Production of the Japan Sea and of the Part of the Pacific Ocean  
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differences in production in the various regions are due  
are mentioned. The authors thank V. V. Zernova and V. S.  
Malevanov who assisted in the investigations discussed here,  
and they also express their gratitude to the hydrological  
and chemical collaborators who took part in the 24th voyage  
of the "Vityaz'". There are 1 figure, 1 table, and 4 references,  
3 of which are Soviet.

ASSOCIATION: Institut okeanologii Akademii nauk SSSR (Institute for Oceanology  
of the Academy of Sciences, USSR)

PRESENTED: June 5, 1958, by A. L. Kursanov, Academician

SUBMITTED: June 5, 1958

Card 3/3



AUTHORS:

*Sorokin. Yu I.*  
Sokolova, G. A., Sorokin, Yu. I.

20-2-57/60

TITLE:

The Intensity of the Bacterial Reduction of Sulfates in the Bottom-Soils of the Gor'kiy Water Reservoir, as Determined With the Aid of  $S^{35}$  (Opredeleniye intensivnosti bakterial'nogo vosstanovleniya sulfatov v gruntakh Gor'kovskogo vodokhranilishcha s primeneniye  $S^{35}$ ).

PERIODICAL:

Doklady AN SSSR, 1958, Vol. 118, Nr 2, pp. 404-406 (USSR).

ABSTRACT:

By this reduction process a great amount of hydrogen sulfides forms in the waters and considerably influences the life therein. For this sulfates and accessible organic substance must be present and anaerobic conditions must prevail. The distribution of these bacteria was sufficiently thoroughly studies in sulfate-rich waters (oceans, salt lakes, fresh-water basins with inflow of sulfate-water, reference 2). From publications follows that the desulfonating bacteria are little spread in low-sulfate fresh-water lakes and that they are of inferior importance for the formation of  $H_2S$ . In the study of the Rybinsk-reservoir and of the Gor'kiy-reservoir built in 1956 the authors found that in spite of a comparatively small sulfate-content the mud of these young waters contains fairly much  $H_2S$  and that desulfonating bacteria are here to be met with in a considerable amount

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The Intensity of the Bacterial Reduction of Sulfates in the Bottom-Soils of the Gor'kiy Water Reservoir, as Determined With the Aid of  $S^{35}$ .

radioactivity of a certain volume of evaporated liquid. The quantity of  $H_2S$  formed during 24 hours was calculated from the radioactivity of the  $CuS$ -precipitate ( $r$ ) according to the formula:

$$[H_2S] = \frac{K_{SO_4} \cdot r \cdot k}{RT} \text{ mg/l 24 hours,}$$

where  $T$  is the duration of the test,  $k$  - the coefficient of the recalculation of the sulfate sulfur to  $H_2S$ . Thionic bacteria were determined on the culture medium with hypo-sulfite. The results are given in table 1. From them follows that the sulfate reduction takes place very actively. In freshly deposited mud 1, 4 - 0,8 mg/l  $H_2S$  form due to desulfonation. In waters with a higher content of sulfate the desulfonation takes place a dozen times slower (reference 4). The quantity of desulfonating bacteria is different according to seasons and is irregularly distributed in the water. In some places 1.800.000 bacteria per 1 g mud were discovered. Such quantities had hitherto nowhere been found. The quantity of the bacteria alone, however, litt-

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.The Intensity of the Bacterial Reduction of Sulfates in the Bottom- 20-2-57/60  
 .Soils of the Gor'kiy Water Reservoir, as Determined With the Aid of  $S^{35}$ .

le indicates an intensity of the process. It did not correspond to the values of the intensity of sulfate reduction in individual places here either. The mud of the Gor'kiy-reservoir contains on the average 50 - 80 mg/l  $H_2S$ . So small amounts may be explained by its diffusion in the mass of water and by the oxidation. It is to assumed that in the water just as in the bottom a continuous regeneration of the sulfates takes place which is caused by the thionic bacteria. It is probable that the accumulation of  $H_2S$  in the mud will unfavorably influence the oxygen-content in winter. There are 1 table and 4 Slavic references.

ASSOCIATION: Institute for Biology of Water Reservoirs AN USSR (Institut biologii vodokhranilishch Akademii nauk SSSR).

PRESENTED: February 19, 1957, by V. N. Shaposhnikov, Academician.

SUBMITTED: February 18, 1957.

AVAILABLE: Library of Congress.

Card 4/4

SOROKIN V. I.

USSR / Microbiology. General Microbiology. Micro-organisms of Water and Air.

F

Abs Jour : Ref Zhur - Biologiya, No 6, 1959, No. 23953

Author : Sorokin, Yu. I.

Inst : Not given

Title : The Role of Chemo-synthesis in the Production of Organic Substances in Water Reservoirs.  
II. The Study of Chemo-synthesis in Silt Deposits by Means of  $C^{14}$

Orig Pub : Mikrobiologiya, 1958, 27, No 2, 206-213

Abstract : The amount of organic substance of bacterial biomass newly formed every 24 hours in silts (Skh) was determined by the more precise method of the author (RZhBiol., 1956, 43583, 1957, 40154) according to the following formula:

$$Skh = \frac{r \cdot Sk \cdot 100}{R \cdot P \cdot n} \text{ ml of carbon per liter of}$$

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SOROKIN, Yu.I.

Role of chemosynthesis in the production of organic substances in  
reservoirs. Report No. 3: Chemosynthetic productivity in various  
layers of water during the summer [with summary in English]  
Mikrobiologiya 27 no. 3: 357-365 My-Je '58 (MIRA 11:9)

1. Institut biologii vodokhranilishch AN SSSR "Borok."  
(WATER SUPPLY,  
chemosynthesis in reservoirs (Rus))

SOROKIN, Yu.I.

Microflora and chemical composition of bottom soils in Rybinsk.  
Reservoir. Trudy Biol. sta. "Borok" no.3:89-111 '58. (MIRA 11:9)  
(Rybinsk Reservoir--Fresh-water biology)

BOROKIN, Yu.I.; MESHEKOV, A.N.

Use of radioactive carbon isotopes in studying the nutrition  
of aquatic invertebrates. Trudy Inst.biol.vodokhran. no.2:  
7-14 '59. (MIRA 13:5)  
(Fresh-water biology) (Carbon--Isotopes)



KRAVTSOV, P.V.; SOROKIN, Yu.I.

Formation of hydrogen sulfide as a process following the reduction of sulfates in Kuybyshev Reservoir. Trudy Inst.biol. vodokhran. no.2:191-196 '59. (MIRA 13:5)  
(Kuybyshev Reservoir--Hydrogen sulfide)

SOROKIN, Yu.I.; ROZANOVA, Ye.P.; SOKOLOVA, G.A.

Studying primary production in Gorkiy Reservoir by the use of  
 $C^{14}$ . Trudy Gidrobiol. ob-va 9:351-359 '59. (MIRA 12:9)

1. Institut biologii vedekhranilishch AN SSSR.  
(Gorkiy Reservoir--Photosynthesis)

SOROKIN, Yu.I.

~~SECRET~~  
Determining the photosynthetic productivity of phytoplankton in  
water by the use of  $C^{14}$ . Fiziol.rast. 6 no.1:118-125 Ja-F '59.

(MIRA 12:2)

1. Borok Scientific-Research Station, U.S.S.R. Academy of Sciences.  
(Phytoplankton) (Photosynthesis)

SOROKIN, Yu. I.

Effect of stratified water masses on primary photosynthetic production  
in the sea. Zhur.ob.biol. 20 no.6:455-463 N-D '59. (MIRA 13:4)

1. Institute of Biology of Water Reservoirs, Academy of Sciences  
of the U.S.S.R., Borok.

(PHYTOPLANKTON)

SOROKIN, Yu.I.

Role of chemosynthesis in the production of organic matter in reservoirs. Report No.4: Feeding of aquatic invertebrates on autotrophic bacteria oxidizing methane and hydrogen. Mikrobiologiya 28 no.6:916-920 N-D '59. (MIRA 13:4)

1. Institut biologii vodokhranilishch "Borok" AN SSSR.  
(WATER SUPPLY microbiol.)  
(BACTERIA)

SOV/20-124-2-54/71

3(9)

AUTHORS:

Sorokin, Yu. I., Snopkov, V. G., Grinberg, V. M.

TITLE:

On the Determination of the Dependence of the Photosynthesis of the Phytoplankton on Submarine Illumination in the Central Part of the Atlantic Ocean (Opredeleniye zavisimosti fotosinteza fitoplanktona ot podvodnoy osveshchennosti v vodakh tsentral'noy chasti Atlanticheskogo okeana)

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 2, pp 432 - 435 (USSR)

ABSTRACT:

On the expedition ship "Sedov" investigations of the primary production of the organic substance by phytoplankton were carried out by means of photosynthesis in March - June 1958 within the framework of oceanographic standard works. Observations concerning a) the submarine illumination and b) the primary production of the organic substance mentioned served as starting material. a) For this purpose a photoelectric measuring device FMPO -57 was used in depths of 0 to 100 m. The device is described. In order to characterize the penetration of light into the depth at each station coefficients of the submarine illumination (h) were computed as the relation

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 synthesis of the Phytoplankton on Submarine Illumination in the Central  
 Part of the Atlantic Ocean

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between the illumination at the depth  $z$  and that on the surface  $z^0$ . The method of determination mentioned in the title is described in reference 1: The water is carried in glasses from a certain horizon, a constant amount of radioactive carbonate  $\text{Na}_2\text{C}^{14}\text{O}_3$  is added and the glasses are then again submerged for  $1/2$  or 1 day to depths of 0, 10, 20, 30, 50, 75, 100, and 150 m. Except in the case of a depth of 150 m also the illumination was measured in these horizons. The algae which live in the water carry the radioactive carbon  $\text{C}^{14}$  from the carbonate into the organic substance of their organisms. The residue after filtration of water from the glasses on a membrane filter is measured by a counter. Its radioactivity shows the amount of  $\text{C}^{14}$  containing carbonate assimilated during the experiment. From this the assimilated amount of  $\text{CO}_2$  is computed and the primary production is determined for a certain water volume. The stations which carried out these investigations are situated on the western coast of Africa, one on the equator (on the northern coast

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On the Determination of the Dependence of the Photo- SOV/20-124-2-54/71  
synthesis of the Phytoplankton on Submarine Illumination in the Central Part  
of the Atlantic Ocean

Below that zone the rate of photosynthesis changes with the  
intensity of submarine illumination. There are 1 figure,  
1 table, and 3 references, 2 of which are Soviet.

ASSOCIATION: Institut okeanologii Akademii nauk\_SSSR (Institute of Oceano-  
graphy, Academy of Sciences, USSR)

PRESENTED: September 22, 1958, by V. V. Shuleykin, Academician

SUBMITTED: September 18, 1958

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On the Determination of the Dependence of the Photo-  
synthesis of the Phytoplankton on Submarine Illumination in the Central Part  
of the Atlantic Ocean

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of South America) and the other in the South of the Sargasso Sea. Table 1 shows the measurement results of submarine illumination. It varies considerably. It may be strongly reduced by the strong development of the phytoplankton. In figure 1 data are compared to each other which characterize the change of the coefficient of the photosynthesis rate  $K_T(1)$  due to submarine illumination  $\eta$  (2) with the depth. Down to a certain depth there is an inverse dependence between these two values, i. e. photosynthesis is suppressed in the surface layer. Photosynthesis attains its maximum where the illumination amounts to 30-50% of the illumination on the surface. This is the optimum depth for algae. In the north-western part of the Pacific and in the Japan Sea (route of the ship "Vityaz") photosynthesis is not suppressed in the upper layer. It may be seen from figure 1 that the rate of photosynthesis in the layer suppressed by light is inversely dependent on submarine illumination. Suppression takes place in the open ocean down to a depth of 20-40 m, in the littoral down to 5-10 m.

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17(4)

AUTHORS:

Monakov, A. V., Sorokin, Yu. I.

SOV/20-125-1-55/67

TITLE:

Attempts to Investigate the Predatory Way of Nutrition of Cyclopes by Means of the Isotopic Method (Opyty izucheniya khishchnogo pitaniya tsikloпов s pomoshch'yu izotopnoy metodiki)

PERIODICAL:

Doklady Akademii nauk SSSR, 1959. Vol 125, Nr 1, pp 201-204 (USSR)

ABSTRACT:

The potential ability of cyclopes to eat various water-vertebrates is well-known (Refs 1-3, 6). The papers referred to give, however, no answer in how far this or that type of nutrition is assimilated. These data could, however, particularly contribute towards the correct definition of the differences between the quantities of nutrition taken by cyclopes during 24 hours when feeding on different sorts of water-animals. For the purpose of clarifying this problem the authors worked out an isotopic method for *Acanthocyclops viridis* Jur. and *Mesocyclops leuckarti* Claus which by means of

$C^{14}$  facilitates the finding of the amount of assimilated living nutrition in the course of a short experiment. The work was

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Attempts to Investigate the Predatory Way of Nutrition of SOV/20-125-1-55/67  
Cyclopes by Means of the Isotopic Method

carried out in 1959 in the Cheremshanskaya bay of the Kuybyshev reservoir. As nutrition of the cyclopes crustacean-filtrators marked with  $C^{14}$  were used: *Daphnia longispina*, *Diaptomus graciloides* and *D. gracilis*, *Diaphanosoma brachyurum* and *Ceriodaphnia quadrangula*. They were traced by feeding on pretaceous algae marked with  $C^{14}$  (Ref 4). Table 1 gives the experimental results. The cyclopes happen to assimilate only a small part of the killed prey (4.8 - 25.7%). In the case of *M. leuckarti* the amount of nutrition fluctuates between 0.7 and 2.3  $\mu$  within 24 hours with a C-content of 2.5  $\mu$  in the body of the cyclope. The highest quantity of nutrition was eaten in the case of feeding on *Diaphanosoma* and *Daphnia* and the smallest in the case of feeding on *Diaptomus* and *Ceriodaphnia*. To the smallest daily amount of food the highest percentage of assimilation corresponds and vice versa. In the case of feeding *A. viridis* on *Daphnia*, *Diaptomus* and *Diaphanosoma* the amounts of food eaten within 24 hours rather approached one another. The percentage of assimilability fluctuated, however, very much.

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Attempts to Investigate the Predatory Way of Nutrition of Cyclopes by Means of the Isotopic Method SOV/20-125-1-55/67

Diaptomus were twice as much assimilizable as Daphnia and more than Diaphanosoma. In the case of feeding on Ceriodaphnia both the daily intake of food and the assimilizability were highest. The percentage of renewal (protsent vozobnovleniya) (P) fluctuates in the case of *M. leuckarti* between 2 and 6% and between 5.1 and 25.7% in the case of *A. viridis*. The quantity P is an index of nutrition intensity and depends on the amount of nutrition eaten and on its assimilizability. In case that the nutrition eaten is not restricted by the factor of accessibility (degree of mobility of the body, size of the body etc) P fluctuates at various types of nutrition with the assimilizability of food (the case of *A. viridis* - a big and strong beast of prey). In this case the factor of accessibility becomes unimportant. In contrast to this in the case of the small *M. leuckarti* this factor has a considerable influence upon the quantity P which decreases very much when feeding on big mobile types or hard-shelled (*Diaptomus*, and *Ceriodaphnia* respectively). With dropping temperature the assimilizability decreases rapidly, whereas the quantity of food eaten within 24 hours remains unchanged. There are 1 table and 6 references,

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Attempts to Investigate the Predatory Way of Nutrition of SOV/20-125-1-55/67  
Cyclopes by Means of the Isotopic Method

5 of which are Soviet.

ASSOCIATION: Institut biologii vodokhranilishch Akademii nauk SSSR  
(Institute of the Biology of Reservoirs of the Academy of  
Sciences, USSR)

PRESENTED: November 15, 1958, by I. I. Shmal'gauzen, Academician

SUBMITTED: November 12, 1958

Card 4/4

SOROKIN, Yu. I.

Bacterial reduction of sulfates in Kuybyshev Reservoir. Trudy Inst.  
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(Kuybyshev Reservoir--Sulfates) (Bacteria, Sulfur)

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Methane and hydrogen in waters of the Volga reservoirs. Trudy Inst.  
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(Rybinsk Reservoir--Water--Composition)

(Kuybyshev Reservoir--Water--Composition)(Methane) (Hydrogen)

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Method of determining primary production in the ocean by  
the use of  $C^{14}$ . Trudy Gidrobiol. ob-va 10:235-254 '60.  
(MIRA 13:9)

(Phytoplankton) (Carbon--Isotopes)  
(Hydrobiological research)



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(CARBON DIOXIDE) (PHOTOSYNTHESIS)  
(RADIOACTIVE TRACERS)

Determination of Primary Photosynthesis Production  
in the Atlantic by Means of the Isotopic Method

S/020/60/131/04/061/073  
B011/B002

to 30 m (Fig 4). (2) Water of mean productivity ( $0.2-0.5 \text{ g/m}^2$ ), including the zone of the moderate waters of the North Atlantic, Canarian Currents, and also the fast part of the South Equatorial and Equatorial counter currents (Stations Nr 42-46, 2-10, 17, 18, 22). Biogenic elements are brought into these parts by turbulent currents mixing with abyssal water (Fig 2). (3) Regions of poor productivity ( $0.1-0.2 \text{ g/m}^2$ ) in the zone of Equatorial currents (Stations Nr 15, 16, 19-21, 23-25). These are masses of "old" surface waters which moved a long way and therefore are poor in biogenic elements. The only phosphate source are weak, turbulent currents from deep layers. (4) Regions of extraordinarily poor productivity (below  $0.06 \text{ g/m}^2$ ). These are clear, light-blue waters of the Saragossa Sea (Stations Nr 30-36). Here, rising of biogenic substances is impossible, since the surface waters show a sinking tendency. In spite a very thick photosynthesis layer (more than 135 m, Fig 4), production here shows the lowest values ever known in the world ocean. Figures 2 and 3 show the vertical distribution of phytoplankton and the density with regard to regions without stratification. Phytoplankton of the former regions shows a tendency towards accumulation in the upper zone of the density jump. Here, the plankton amount sometimes exceeds its concentration at the

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Primary production in the Atlantic Ocean. Trudy Gidrobiol. ob-va  
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